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STANDARDIZATION :
A PRE-REQUISITE FOR DEVELOPMENT

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UNITED NATIONS CONFERENCE
ON
THE APPLICATION OF SCIENCE AND TECHNOLOGY FOR THE
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Agenda item : D.3.3 Specifications and standards

STANDARDIZATION: A PRE-REQUISITE FOR DEVELOPMENT

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INTRODUCTION

1. In the application of science and technology to industry, standardization provides the basis on which such application can take place for economic benefits to ensue. In fact standardization is an integral part of science and technology, for neither science nor technology could have developed without the standardization of units of measurements, of terms, symbols, formulae and the like.

2. Techniques of transformation of raw materials into finished products emerge from the development of science and technology. However, production is not an end in itself, the product must be able to satisfy some end-use. Standardization provides the link between production and consumption so that one may conform to the other. The latest definitions of standards and standardization accepted recently by the world's authority, International Organization for Standardization (ISO), are as follows:

(a) STANDARDIZATION - Standardization is the process of formulating and applying rules for an orderly approach to a specific activity for the benefit and with the co-operation of all concerned, and in particular for the promotion of optimum overall economy taking due account of functional conditions and safety requirements;

It is based on the consolidated results of science, technology and experience. It determines not only the basis for the present but also for future development, and it should keep pace with advances.

Some particular applications are:

1) Units of measurement
2) Terminology and symbolic representation
3) Products and processes (definition and selection of characteristics of products, testing and measuring methods, specification of characteristics of products for defining their quality, regulation of variety, interchangeability, etc.)
4) Safety of persons and goods

(b) STANDARD - A standard is the result of a particular standardization

effort, approved by a recognized authority. It may take the form of

1) a document containing a set of conditions to be fulfilled (In French "norme")

2) a fundamental unit or physical constant - examples: ampere, absolute zero (Kelvin) (In French "etalon")

3) an object for physical comparison - example: metre (In French "etalon").

3. The transition from production to consumption occurs not only at the ultimate point of use but also at a number of intermediary points both in industry and trade. The growth of industry in any country is marked by a corresponding rise in the inter-dependence of the different spheres of production on one another. Each has to look to others for the supply of raw materials, machinery, components and at times services; and each, in turn, provides similar facilities to others. The resulting complex relationship cannot be sustained unless adequate understanding is established for the innumerable contacts when products pass from one hand to another, be it within a plant, or from one plant to another, or from a store to a householder, or for that matter from one country to another. One of the main functions of standards is to facilitate the flow of products through these transition points.

4. Apart from helping commercial movement and industrial exchange in this manner, standards also conserve productive effort by reducing unnecessary variety, by ensuring interchangeability and by making mass production possible. Standards thus lead to the best utilization of man and material resources of a community or country.

5. For a less-developed country, co-ordinated development of industries, conservation of resources and achievement of high level of productivity are of obvious importance. So also is the need to boost exports to earn more foreign exchange to provide for the growing needs of importing capital equipment, so essential for initial development. Standardization, therefore, is a primary need for the development of newer countries.

STANDARDIZATION SPACE

6. The field of standardization is best represented by a hypothetical standardization space shown in Figure I (see Annex 1). The three dimensions of this space are 'subject', 'aspect' and 'level'.

(a) Subject: Standardization subjects are material things, abstract notions, formal symbols, etc, which are suitable for being standardized e.g., screw threads, limits and fits, graphical symbols. A related group of subjects belonging to any branch of economic or cultural activity is considered as a standardization domain. Such groups may be constituted in different ways in regard both to the guiding principles to be followed and the extent of a given domain to be defined. Following are some examples of standardization domains:

Engineering	Textiles
Transport	Chemicals
Housing/Building	Industry
Food	Commerce
Agriculture	Science
Forestry	Education

There being a large number of standardization subjects for each standardization domain, for the sake of convenience only standardization domains are indicated on the X-axis of Figure I.

(b) Standardization Aspect - A standardization aspect is a group of similar and related requirements of a standardization subject which are dealt

with in a given standard. Examples of standardization aspects are:

i) a set of nomenclature or definitions of terms;

(ii) a scheme for limitation of variety of sizes, shapes, grades or other parameters, designed to meet most economically the needs of the consumer. (This also includes dimensional freezing of component designs to ensure interchangeability);

(iii) constructional details;

(iv) a specification for quality, composition or performance of a material, an instrument, a machine or a structure;

(v) a method of sampling or inspection to determine conformity to a specified requirement of a large batch or lot of material or products by inspection of a sample;

(vi) a method of test or analysis to evaluate specified characteristics of a material or chemical;

(vii) a method of grading and grade definitions for natural products, such as timber, minerals, etc;

(viii) a code of practice dealing with design, construction, operation, safety, maintenance of a building, an installation, or a machine;

(ix) a code of practice for packaging, conservation or transportation of materials and products.

(c) Standardization Level - A standardization level defines a group of persons who are to use the standard. Standards corresponding to the more important levels occurring in contemporary practice may be classified as follows:

(i) a company standard, prepared by common agreement between various departments of a company or production unit for guiding its purchase, manufacture, sales, and other operations;

(ii) an association or trade standard prepared by a group of related interests in a given industry or within a given profession;

(iii) a national standard promulgated after consulting all interests concerned however remotely with the subject in a country, through a national standards organization which may be a governmental, a non-governmental, or a quasi-governmental body;

(iv) an international recommendation or standard, such as those of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), resulting from an international agreement between independent sovereign nations having common interests.

7. It is obvious that the standardization space described above is not a mathematical space of either continuous or discrete variables. It is to be regarded merely as a convenient device to illustrate the various attributes of standardization, which are of the nature of independent variables.

8. In addition to the three attributes, standards may also have a fourth attribute. The fundamental standards of science, those of weights and measures for example, are not expected to be changed from time to time, though refinements are often made in defining and maintaining these standards. By comparison, industrial standards are more temporary in character, being subject to revision with the development of science and progress of technology. In this context, standardization space may be considered to have a fourth dimension in time.

AIMS OF STANDARDIZATION

9. For a given standardization problem, it is possible to establish the specific aims of standardization by determining its position in the standardization space. However, there is no hard and fast division between the aims of standardization at, say, the national level as distinct from the aims at, say, the association level. The ultimate aims of standardization are applicable to all levels, though a distinct functional character may be ascribed to standards at each specific level.

10. The aims of standardization in general, applicable to all levels, are to achieve

(a) overall economy,

(b) protection of consumer interest, and

(c) safety and protection of health and life.

(a) Overall Economy - Overall economy comprises economy of human effort, materials and machines, power and energy, on the one hand and on the other, the combined economy of the producer and the consumer. The attainment of overall economy creates maximum productivity for the country as a whole, though the economy of individual units or components of production may not be at the optimum for each. For example, greatest economy in material may preclude greatest economy in labour. The pursuit of overall economy results in simplification and reduction of variety of products and components and elimination of avoidable wastage during handling of materials, processing, transport, and in general exchange of goods and services. It sometimes involves saving of essential materials by substitution with more readily available materials which may or may not involve immediate or apparent saving in cost of human effort but, in the national economy, conservation of such materials may be essential for other important reasons.

(b) Protection of Consumer Interest - Protection of consumer interest is ensured through adequate and consistent quality of goods and services. The notion of quality of service covers not only material services such as the attainment of higher quality or performance or functional interchangeability of consumer articles, but also non-material services and conveniences, such as ready availability of standard goods from stock, the simplicity coupled with serviceability of consumer equipment, and generally such things as makes man's life and work easier, more effective and pleasant.

(c) Safety and Protection of Health and Life - Provision for safety and protection of health and life is an essential element of those standards where safety requirements may arise. It may concern goods in general use or materials or processes during production. Examples are standards for limiting impurities in food stuff, standards for storage of radioactive materials, regulations for earthing of electrical wiring and equipment, etc.

11. Achievement of the aims discussed under (a), (b) and (c) above corresponds to the creation of order in industry, trade and commerce and in human relationships generally. Verily, it has been said by an eminent Indian thinker that standardization is to industry and commerce what culture is to society, that is, just as rules of civilized behaviour regulate social intercourse of man and his appreciation of cultural values enrich his intellectual and spiritual life, so does standardization help to regulate the conduct of commerce and trade in a smooth and efficient manner, and assist in improving productivity and efficiency of man and machine.

FORMULATION OF STANDARDS

12. It follows from the aims of standardization that standards must fulfil

the interests of both producers and consumers. This has given rise to a more or less universal procedure of formulating standards through intensive consultation among the interests concerned. The extent and details of such consultation may vary from country to country depending on the economic and political structure, but the fact remains that rarely standards are laid down arbitrarily by a superior authority without consideration of the views of those who would have to implement or observe them.

13. Obviously, the approach to the procedure for formulating standards would vary with the level of the standardization space (Figure I). Thus, at company level, depending on the size of the unit and the nature of its activity, company standards may be developed either departmentally or through formal committees representing the various departments of the company. In the latter case as also in the case of association and trade standards, the procedure followed and principles observed are generally comparable to those of national standards as discussed below.

14. At the national level, the national standards body or bodies of a country provide the forum for consultation among the national group interests. The normal procedure is to form expert committees with representatives from producers, consumers and technologists to prepare draft standards on the basis of common agreement. The draft standards are then widely circulated all over the nation to every important interest concerned with the subject matter of the draft. Comments are invited for further consideration by the expert committee, which takes final decisions and ensures that in the final form the standard represents the largest possible consensus of opinion within the country. It will be appreciated how a standard emerging out of such a procedure tends automatically to ensure the widest possible acceptability.

15. The organization of the national standards body should obviously be such as to facilitate the bringing together of the diverse interests in its forum. However, it would be natural to expect some variation in the pattern and status of national standards bodies in different countries. The status varies from purely non-official to purely official. In some countries, the national standards body is officially sponsored and supported, but its administration is left to a council or board of nominees representing government, industry, trade, commerce and other interests vitally concerned with standardization. For a developing country, this pattern seems to be most suitable as it enables official planning and direction to co-exist with the initiative of private enterprise.

16. The development of international standards follows the same principles and procedure as for national standards. The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) are the principal agencies of international standardization. The objective of ISO is to promote the development of standards in the world with a view to facilitating international exchange of goods and services and to developing mutual co-operation in the sphere of intellectual , scientific, technological and economic activity. As means to this end, it may

(a) take action to facilitate co-ordination and unification of national standards and issue necessary recommendations to member bodies for this purpose;

(b) set up international standards provided, in each case, no member body dissents;

(c) encourage and facilitate, as occasion demands, the development of new standards having common requirements for use in the national or international sphere;

(d) arrange for exchange of information regarding work of its member bodies and of its technical committees;

(e) co-operate with other international organizations interested in related matter, particularly by undertaking at their request studies relating to standardization projects.

The ISO membership is open to all national standards bodies. Its work is conducted through technical committees composed of delegations from member bodies wishing to take part in it.

17. The objective and working of IEC, which, though organizationally distinct but which functions as an electrical division of ISO, are similar to those of the latter. Its scope of work is, however, confined to electrical technology and may be described under the following two general categories:

(a) work aiming at improving understanding between electrical engineers of countries by drawing up common means of expression; unification of nomenclature; agreement on quantities and units, their symbols and abbreviations; standardization of systems of units; and graphical symbols for diagrams.

(b) Standardization of electrical equipment, involving the study of problems of the electrical properties of materials used in electrical equipment; standardization of guarantees to be given for certain equipment as to their characteristics, methods of test, quality, safety and dimensions controlling interchangeability.

18. Whatever be the level of standardization, an important point to note is that standards belonging to a given level must take into consideration related standards at the higher and the lower level. The ideal is to achieve a pyramidal structure of standardization in which company standards form the basis of national standards and national standards form the basis of international standards. However, in no country the sequence of standardization can be made to follow any given pattern strictly. Resulting from the historical development of industry and commerce, one or the other level of standardization may be found to be more prominent. For example, in certain well developed countries such as the USA, company and association standardization activity is highly developed, in others like UK national standardization predominates.

19. In less-developed countries, industrial development is almost invariably dependent on the outside assistance a country is able to obtain and this assistance in the form of technical personnel, industrial know-how, capital equipment, etc, may come from a number of different industrial groups in different countries. Thus, every production unit in a newly developing country tends to adopt and follow the pattern of standardization of the parent collaborating organization. This is the time when national standards are most urgently needed for guidance and co-ordination and, more often than not, they are conspicuous by their non-existence. So the prime need for a country aspiring to develop fast is to bring into being a system of national standards, which will help the development of industries from the earliest stage of planning and design, to erection, production and distribution. It is only through such an approach that the usually limited financial resources of a developing country and its indigenous raw material could be most effectively put to work.

20. It was fortunate, therefore, that in India the Indian Standards Institution (ISI) was brought into being in the year of her independence 1947. By the time the national planning effort was initiated in 1951, ISI had already done most of the spade work required for laying a sound foundation for a strong organization. As the country went from plan to plan and the industrial activity acquired momentum, demand for ISI standards and other services outpaced the man-power and physical resources of the Institution. The position today is that ISI, with its over 2 000 published standards, is in a position not only to guide the

existing industries in their effort to establish company standards, rationalize their productive effort and institute quality control measures, but it is also looked up to in planning future industries and in organizing export promotion effort.

21. The purpose of the organized standardization activity described above is not only to formulate the requisite standards, but also to keep them abreast of scientific discovery and technological advancement. Research in science and technology, therefore, plays an important role in standardization. In as much as the objective of a research is to make improvement over existing methods and means of production, by devising more economic, functionally more useful designs, by discovering more safe and more reliable materials, processes, methods, techniques of control, and the like, the objective of standardization is to make them readily applicable in day-to-day industrial practice. The fruits of research, therefore, furnish the basis on which standards are founded and when further advancements are made, the new knowledge helps improve existing standards through revisions and amendments. Standards thus move with scientific and technological development and enable industries to grow and improve as know-how expands.

IMPLEMENTATION OF STANDARDS

22. It is obvious that over-all economy and other benefits of standardization can only be secured, if standards are widely adopted and used in all walks of economic life of a nation, wherever they are applicable. Standards may be implemented either voluntarily or under obligation arising from existing legislations or from orders of higher authority. The social and economic structure of a country determines whether emphasis is laid on mandatory enforcement or on voluntary adoption. In a country where economy is completely controlled, standards are necessarily obligatory in nature. In a comparatively free economy, standards are by and large expected to be used without any compulsion, except perhaps in limited spheres.

23. The principle of voluntary implementation of standards is derived from the fact that standards are formulated by common consent of all interested parties to satisfy an existing need, and should, therefore, command ready acceptance by all concerned without legal pressure. Though this statement is generally true, it overlooks certain very important factors. Since standards are developed to satisfy the objective of overall economy, the economy of a particular use or of an individual user may at times be in conflict with that of another. Compromise between individual and overall economy is a normal feature of standardization and it may be generally expected that implementation of standards may cause some initial hardships at some places. Besides, a better understanding of the ultimate benefits of standardization grows only with the growth of industries and then again not without considerable effort being spent in promoting such understanding. Implementation of standards may sometime involve a change in the existing production equipment and procedure and the additional expenses and effort thus involved may seem at first sight unremunerative to the enterpreneur.

24. A great deal of persuasion and promotional work to spread the knowledge of standardization thus becomes necessary to secure voluntary implementation of standards. This is particularly an important phase of activity of national standardization bodies of developing countries, where dissemination of all knowledge assumes special significance. Indian Standards Institution is perhaps the first such body to organize an elaborate plan of publicity including paid advertisement in the press, besides exhibitions and fairs, films and slide, press notes and informative articles etc.

25. However, there are spheres of public life where the observance of standards cannot be left to chance, as for example where public health or public safety is concerned. Standards of purity of drugs and foodstuffs, electricity rules of safety for protection against electrical hazards are examples of this category. With the development of industries and the growth of the use of electricity in

industry and home, there is need to be more vigilant about safety to health and property. In a less-developed country, this aspect is likely to be overlooked in the initial stages of development, though it deserves much more serious attention than in a developed country.

26. Organized consumers in any country can set the pace for implementation of standards. If they adopt national standards for their purchases, a large enough demand for standard items would grow to enable producers to adjust their production accordingly. Once standard items are produced on a large scale, it would become uneconomical to supply non-standard or special products to cater to the needs of small purchasers, who would thereby be encouraged to adopt standard products. Thus a cycle of demand and supply of standard goods conforming to national standards could develop.

27. In a less-developed country, government departments and their attached or associated organizations perhaps form the largest bulk of organized consumers. It is within the competence of these organizations to purchase according to national standards but a policy directive from the highest governmental authority is necessary to crystallize action and give necessary clearance to purchasing officials. Once government takes a firm decision, it becomes possible to persuade other organized consumers in public or private enterprises to follow the lead. Government of India, in fact, has given such a lead, which is being taken up by States' Governments and more gradually by local authorities as well.

28. The growth of company standardization activity also helps implementation of standards, for the very purpose of company standardization is to provide a basis of standard practices and procedures for all activities of the company, including procurement of materials, designing of products, processing and manufacture, control of quality, sales and distribution etc. For a long term programme of implementation of standards, it is, therefore, essential to promote the knowledge and methodology of standardization at the company level.

CERTIFICATION MARKING

29. Another effective means of implementing standards is to provide certification marking facilities for goods conforming to accepted standards. A certification mark is a third-party guarantee to the purchaser that the goods have been inspected, tested and certified by or under the supervision of a competent agency and they may be purchased with a reasonable assurance of quality. The primary purpose that certification marking serves is to convey this assurance when the purchaser has no readily available facility for inspection and testing or when such testing is clearly uneconomical, such as for a small volume of purchase.

30. The principles on which certification marking schemes are formulated are two-fold. Firstly, the organization operating the scheme must be an independent and technically competent body with no business interest connected with production, distribution or supply of goods. Secondly, the operating organization must be satisfied that the manufacturing equipment, system of inspection and method of quality control available in the factory where the goods to be certified are manufactured, are adequate to ensure conformity with the accepted standards. In addition to this in-production control, an independent vigilance and a continuous check on quality is to be maintained by drawing samples from the production line and from stocks and from the open market, tests being conducted either by the operating organization itself or at its instance by independent laboratories.

31. The national standards body of a country is undoubtedly the best suited agency to operate certification marking schemes. Many national standards bodies have in fact extended their functions to this activity. The authority for operating such schemes is sometimes derived from existing legislation, which may permit the registration and operation of certification marks, or from

special legislations enacted for the purpose. In India, a special legislation exists, 'The Indian Standards Institution (Certification Marks) Act, 1952' which empowers the Institution to

(a) establish and publish, in such manner as may be prescribed, the Indian Standard in relation to any article or process;

(b) specify a Standard Mark, to be called the Indian Standards Institution Certification Mark, which shall be of such design and contain such particulars as may be prescribed to represent a particular Indian Standard;

(c) grant, renew, suspend or cancel, in such manner as may be prescribed, a licence for the use of the Standard Mark;

(d) levy such fees for the grant or renewal of any licence as may be prescribed;

(e) make such inspection and take such samples of any material or substance as may be necessary to see whether any article or process in relation to which the Standard Mark has been used conforms to the Indian Standard, or whether the Standard Mark has been improperly used in relation to any article or process with or without licence.

32. Under this legislation ISI has currently some 400 licences in operation in some 250 production units. They relate to about 125 Indian standards covering as many products, and the total annual production under these licences is estimated to reach in the near future the equivalent of some 475 million US dollars. Under another Indian legislation, agricultural products are graded and certified, which includes a good many export commodities. Under this system, a total annual production amounting to some 150 million US dollars is covered. Though all this represents a fraction of national production today (say about 2 percent), yet a good beginning may be said to have been made for a newly developing country.

33. Certification marking has obvious advantages both to the producer and to the consumer. A small consumer, even though willing to pay a little extra for quality, can never be certain of the quality he buys, since more often than not he has neither the means nor the requisite experience and knowledge for checking the quality. Certification marking simplifies his problem. It is also welcome to industrial and organized purchasers as a guarantee of quality and performance. For the producer, the mark on the one hand affords protection against unfair competition with cheap and non-standard goods and on the other brings him the assistance of a competent agency which evaluates and maintains the standard of his production.

34. It is desirable that the government of the country should lend its support to encourage certification marking by the national standards body. If government as the biggest organized consumer agrees to give certified goods some preference, either in price or otherwise, in all official purchases, it would go a long way in establishing certification marking in industry and trade.

35. For the export trade of a less-developed country, certification marking operated by the national standards body could become even more valuable than in the internal trade. With certified goods, it would be easier to convince overseas customers of the quality of supplies, making pre-shipment post-landing inspection superfluous and unnecessary. The legal provision of penalty against the misuse of certification marks is an additional guarantee for consumers in the home market and abroad. Apart from the penalties, suppliers are also under obligation to replace, free of cost, any defective supplies bearing a certification mark.

36. It may be of interest to mention here that through government regulation, it has been banned to export from India any of the following products unless

they are duly certified by one of the two agencies mentioned above:

1. Aluminium utensils
2. Tea unless packed in certified tea-chests
3. Tobacco
4. Sandalwood oil
5. Lemon grass oil
6. Raw wool
7. Sun hemp
8. Bristles

Bringing other products under similar coverage is constantly under consideration, but a demand arising from overseas purchasers is bound to accelerate this process.

URGENCY OF ACTION BY LESS-DEVELOPED COUNTRIES

37. The foregoing gives a brief account of the background against which the organized standardization activity is being carried out nationally and internationally, with a few illustrative examples. The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), together with the national standards bodies of some 46 countries, provide the world wide organizational net-work for this activity. As a distinct economic activity, standardization has grown quickly over the last 40 or 50 years. Its present magnitude and rate of growth indicates that the basic concepts and procedures crystallized over these decades are sound in principle and that the possible benefits have become widely enough recognized to gain active support from those primarily concerned.

38. In industrially developed countries, the present concept of standardization has grown up from recognition of the need to co-ordinate, adjust and bring about economy and harmony in the existing pattern of industries, where industrial production has often preceded standardization. It does not necessarily follow that the same sequence of historical development would be suitable for less-developed countries also. On the contrary and for obvious reasons, co-ordination is more difficult at an advanced stage of development than in the early stages. One major factor is the vested interests and the consequent cost and inconvenience of making a change in the schedule or pattern of production. The experience of national standards bodies of industrially developed countries bears adequate testimony to the manifold difficulties that have to be overcome for introducing standardization in existing enterprises. It is as a result of this experience that they have become more vigilent, particularly in respect of the newly developing industries, for example in the field of nuclear energy, automation, electronic computers and the like.

39. For the less-developed countries, therefore, it would be much more beneficial to let standardization precede industrialization, particularly at the national level with such guidance as may be available from the existing international standards and recommendations of ISO and IEC or even without such guidance, if need be. Industrial planning has of necessity to presume the existence of some standards, and besides economic gains to be achieved from pre-planning of standardization can be of considerable magnitude particularly for a developing country. The steel economy project of the Indian Standards Institution may be cited as an example.

40. The aim of this project was to achieve economy in the use of steel in structures through the adoption of standards all along the line from the stage of production, through design, fabrication and erection, to use and maintenance. In production, considerable emphasis was given to the rationalization of shapes and sizes of sections, whose designs had been frozen years ago. New standard sections now developed by ISI save about 10 percent of steel and all the new mills installed during recent years in India or to be installed in future are to produce these new sections. The use of cold-formed sections made from strip is also being standardized which could save up to 40 percent of the steel material. Standards for welding equipment and accessories and codes for welding practices have been developed to further economize on steel by eliminating

rivetting. Similarly, the new and improved design codes for steel structures now enable Indian engineers to use more rational factors of safety and loading criteria and also permit the use of more economical and up-to-date formulae for designs.

41. On a conservative estimate, about 20 per cent of steel may be saved, if all these measures now available to the engineer are fully implemented. In the context of 10 million tons of production of steel, an appreciable quantity of which is used for structural purposes, a saving of even 1 million tons per year would amount to the equivalent of well over 100 million dollars. Compared to this the cost of steel standardization project was a mere flee-bite.

42. A part of the steel economy project was concerned with rationalization of the varieties of alloy and special steels required for miscellaneous industrial uses. Indian industries, like those of most other newly developing countries, import equipment and know-how from all parts of the world, which has resulted in the demand for well over one thousand types of special and alloy steels including tool steels, based on a variety of overseas specifications of various industrial groups in different countries. The position is not only wasteful, but it also precludes the possibility of indigenous production as the demand for each type of steel is necessarily very limited. After an extensive study, it has been possible to reduce drastically the varieties of alloy and special steels to some 130 varieties and also to minimize the use of imported alloying elements, such as nickel and molybdenum and to maximize the use of indigenously available alloying elements such as manganese and chromium. As a result of this project, it has now been possible to proceed with the schemes for setting up several new alloy steel plants, a number of which are currently under construction.

CONCLUSION

43. In planning for standardization, developing countries have an obvious advantage over the developed countries. They have the possibility to learn from the accumulated experience of other countries as reflected in the latters' published standards and more so from the recommendations of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). This vast store of knowledge and experience is there to draw upon and to enable developing countries to plan their industrial development with the least amount of wastage and conflict and with utmost expedition. But the existence of a national standards body is an essential pre-requisite, for it is only through such a specialized agency that a developing country can channelize the two way traffic of knowledge and experience that standardization essentially implies.

ANNEX 1

ANNEX 1

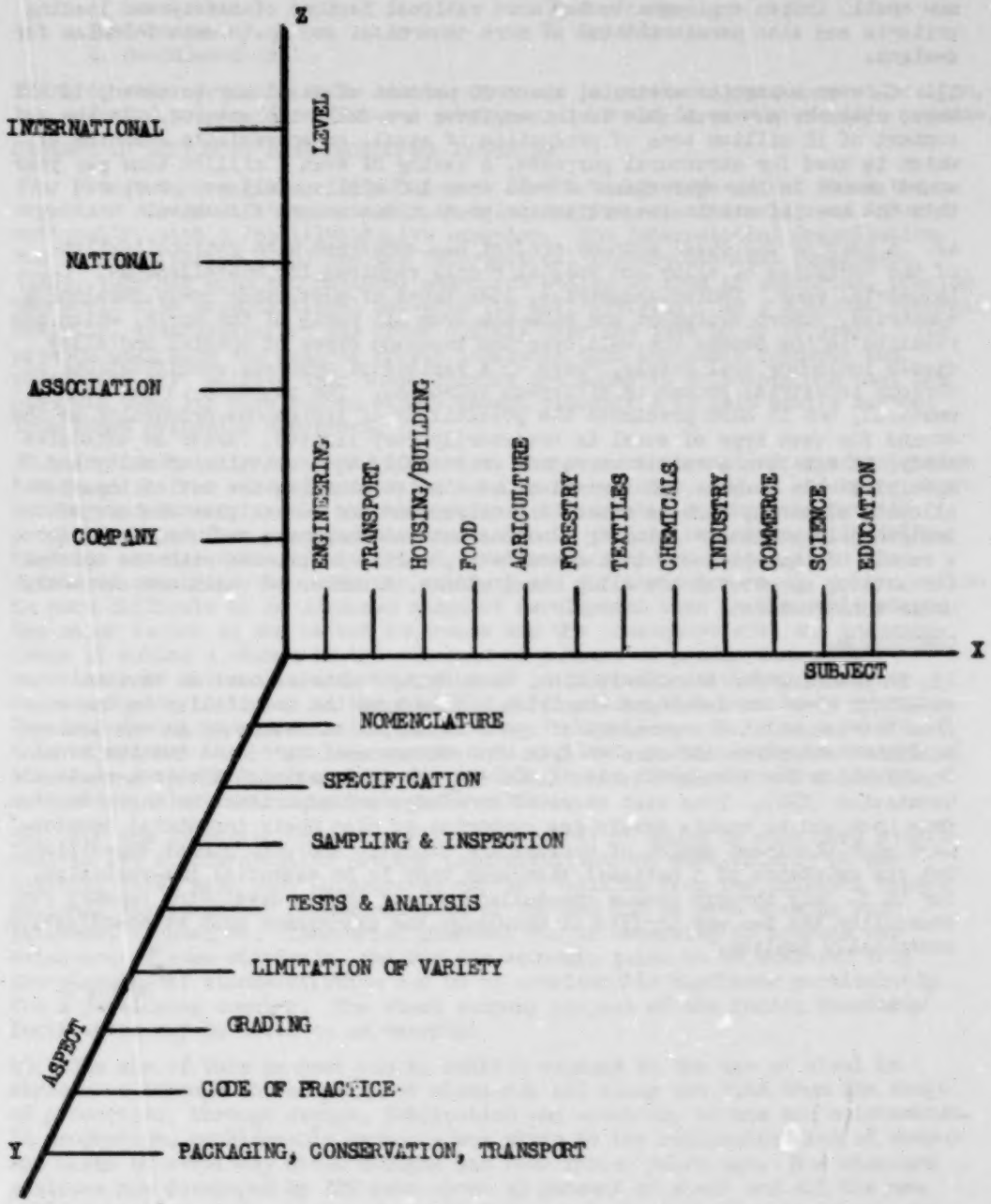

FIGURE I DIAGRAMMATIC REPRESENTATION OF STANDARDIZATION SPACE

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